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THE SCOPE OF ANTHROPOLOGY.

Science de l'Homme et Méthode anthropologique. By Alphonse Cels. Pp. vi+467. (Paris: Félix Alcan; Bruxelles: J. Lebegue et Cie., 1904.) Price 7 francs.

THERE has always been a great difference of opinion about the scope of the science of anthropology. Huxley's view was that anthropology deals with the whole structure, history, and development of man. Another authority subdivides the subject as follows:—(1) Man's place in nature, *i.e.* his relation or standing to the animal kingdom as a whole; (2) his origin, whether from one pair or otherwise; (3) classification of races, with delineation of their chief characteristics; (4) antiquity of man; (5) language; (6) development of civilisation as a whole. Mr. Fallaize, in a paper read last year before the Anthropological Institute, has given the following main subdivisions:—(A) man's place in nature; (B) physical structure; (C) physical functions; (D) specifically human activities; and makes divisions (2) and (3) of the previous classification subdivisions of his class (A).

These examples will illustrate the wide variety of opinions held by authorities about the scope and the method of classification of the subject-matter of anthropology. The impression one gets from the consideration of these schemes is that it is not within the capacity of any one man to be an anthropologist in the widest sense of the term. The definitions of the scope of anthropology given above include many separate sciences, such as anatomy, physiology, philology, archaeology, which in themselves are sufficient to absorb the energies of any single student, and which were in existence before the science of anthropology was created. Many branches of the study of man must therefore as a matter of practical convenience be abandoned to special sciences, and if a science of anthropology is to have any *raison d'être* it must be content to take the results of the studies of the anatomist, the physiologist, the psychologist, the archaeologist, &c., and to coordinate and correlate these results with the view of discovering the more general laws of human nature.

The sciences at present generally included among anthropological studies have not been created by a subdivision of the whole subject-matter relating to man into watertight compartments, but usually some end of special theoretical or practical interest has formed a centre around which the science has been built up. For example, the interest excited by the perception of the great differences in the characteristics of different races has led to the creation of the science of ethnology, and the object of this science is to utilise all knowledge which may throw any light on the question of race. It overlaps without completely including prehistoric archaeology, anthropometrics, psychology, and many other sciences.

This appears to be the only practical way of studying anthropology, but there can be no doubt that a great deal might be gained by the careful setting out of the

whole of the subject-matter which, in the widest sense, could be taken as included in a complete science of man. New subjects of study which were previously overlooked may in this way be suggested, and new subordinate sciences created.

This very useful work has been well done by M. Cels in the book under review in a very suggestive though somewhat diffuse and fanciful style. About one-half of the book is devoted to an exposition of the logical methods of science, and as these methods are not more specially applicable to anthropology than to any other science, this part of his work might very well have been omitted or given in a much more condensed form. The same information might be found in any modern treatise on logic.

When we come to the part of M. Cels's work which is more especially relevant to its title, we find his subdivision of the subject-matter of the science of man interesting, suggestive, and well worth the attentive study of anthropologists.

Anthropology, according to M. Cels, is to be divided in the first place into two main subdivisions, namely, the study of the nature of man and the study of the life of man, *i.e.* man is to be studied from the static point of view and from the dynamic point of view. In the second place, each of these main divisions is again subdivided into the study of the intrinsic and extrinsic conditions of their existence. Finally, each of these four subdivisions is again subdivided into three, in the first of which man is regarded as a Unity, *i.e.* as an individual, in the second as a Duality, *i.e.* as made up of body and mind, and thirdly as a Harmony, *i.e.* as a bisexual being which is only completed by the union of the two sexes for the reproduction of the species.

This division of the subject-matter of anthropology appears in some respects a little fanciful, but it is very plausibly worked out by M. Cels in his treatise. The author's view of anthropology is that it includes the study of the body and the mind of man, in their constitution as well as in their activity. This part of the subject is fairly well covered by the existing sciences of anatomy, physiology, and psychology. M. Cels also emphasises the necessity of studying the environment of man, namely, the earth on which he lives, his fellow-men and lower animals, and any other influence which reacts on his organism and on its activity. The effects of the moral as well as the material environment must be studied. The study of the influence of environment on mankind has not received so much attention from anthropologists as it deserves.

As a matter of practical convenience, the detailed study of the body and mind of the individual man must be abandoned to anatomy, physiology, and psychology; anthropology can only concern itself with the coordination of the results of these sciences. It may compare the anatomy, physiology, and psychology of different races of contemporary men, or of men of the present with those of the past. This field is to a great extent covered by physical anthropology, prehistoric archaeology, the study of culture, and experimental psychology.

Though M. Cels has devoted so large a part of his work to the logical methods of anthropology, he tells us little or nothing of the immense advance that has been made in recent years in anthropometrics. No science makes much progress until precise measurement is applied to the characters the distribution and correlations of which are to be ascertained. Measurement has been applied to the body of man for more than fifty years, but only within the last few years has a statistical method been devised which enables us to give the true interpretation of the vast amount of anthropometric statistics that has been accumulated. But the work of Galton and Karl Pearson receives no notice from M. Cels in his work on the science of man and anthropological method; we are referred rather to the works, published fifty or more years ago, of Cuvier, Krause, and Saint-Hilaire, whose ideas on co-relation were mere shadows of the precise knowledge we now possess.

As a highly abstract and suggestive exposition of the nature and scope of anthropology, the book deserves a place in the library of the anthropologist.

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PROGRESS IN THE CHEMISTRY OF FATS.

Chemical Technology and Analysis of Oils, Fats, and Waxes. By Dr. J. Lewkowitsch, M.A., F.I.C. Third edition, re-written and enlarged. Two vols. Pp. xxviii + 1152. (London: Macmillan and Co., Ltd., 1904.) Price 36s. net.

IN this, the third edition of Dr. Lewkowitsch's well known work, there is naturally much that was not included in the former issues. And since the second edition was itself a somewhat bulky tome of more than eight hundred pages, the author has wisely divided the present work into two volumes, corresponding broadly to the analytical and technological branches into which his subject resolves itself.

Briefly, the first volume deals with general principles, the second with individual products. In the earlier chapters there is a discussion of the theory of saponification, and a description of the glycerides, esters, alcohols, and acids which form the proximate constituents of oils, fats, and waxes; the rest of the first volume is mainly devoted to an account of the chief physical and chemical methods now employed in the examination of these substances. In the second volume, after a short generalised description of their commercial methods of preparation, the individual oils, fats, and waxes are dealt with. Under each article are given its source, characteristic features, physical and chemical constants, and such miscellaneous information as the technical uses of the product and the nature of its probable adulterants. Finally, the last two chapters embody an account of modern manufacturing processes employed in the various industries—soap, candle, rubber, glycerol, and so on—for which the raw materials are furnished by oils and fats.

To specialists, the foregoing summary will show the present arrangement of what is now the standard English book of reference on the subject. To chemists who have not followed the progress of the chemistry

of the glycerides very closely it may be useful to indicate a few of the more recent developments which, among many others, Dr. Lewkowitsch has described or referred to in the book under review.

Looking back over the work of the last few years, what strikes one as being the most notable advance in the chemistry of fats is the recognition of mixed glycerides as frequent if not normal constituents of fats and oils. Since the days of Chevreul, until quite recently, these latter bodies have been almost universally regarded as mixtures of simple triglycerides—usually triolein, tripalmitin, and tristearin. True, evidence was adduced more than a quarter of a century ago, on the one hand by Bell and Lewin, and on the other by Blyth and Robertson, which pointed to the fact that butter-fat contained a mixed glyceride, oleopalmitobutylin. But, probably owing to the difficulty of isolating and definitely proving the identity of such compounds, the observation long remained almost unnoticed. During the last few years, however, the mixed glyceride oleodistearin has been obtained by Heise from kokum butter, stearopalmitin by Hansen from tallow, oleopalmitostearin and oleodipalmitin by Klimont from cocoa-butter, and daturodistearin by Kreis and Hafner from lard. This does not exhaust the list; and, indeed, the probability is that on further investigation mixed triglycerides will be found in most oils and fats. Several have also been synthesised, chiefly by Guth; thus two isomers of steardipalmitin have been prepared, the α variety from α -monostearin and palmitic acid, and the β form from α -dipalmitin and stearic acid.

Another point of interest is the frequent, and perhaps general, occurrence of fat-splitting enzymes such as steapsin in both vegetable and animal oils and fats. The author is strongly in favour of the view that the rancidity of fats is due initially to hydrolysis of the glycerides by these ferments. To this, however, one possible objection suggests itself. Enzymes are usually destroyed at moderately high temperatures—e.g. maltase at 80°. Is there any evidence to show that lard or tallow prepared at steam-heat, or any fat specially raised to a temperature of, say, 95° to 100°, does not turn rancid? If it does not, so much the better for the enzyme theory of rancidity. If it does, one would still like to have other evidence that the enzymes present are capable of withstanding these higher temperatures.

As regards the analytical chemistry of fats, the most important among recent advances is undoubtedly Hehner and Mitchell's method of determining stearic acid. It is not an ideal process, and shows at least one anomaly; but it does place in the chemist's hands a valuable and long-wanted means of estimating, with reasonable accuracy and expedition, the proportion of one of the most frequent constituents of natural glycerides. To the same investigators, following Hazura, is also due the working out of what promises to be a very useful aid to the study of unsaturated glycerides, namely, the quantitative determination of their hexabromide derivatives. Of new methods having an immediate value to the practising analyst there may be mentioned Bömer's phytosterol test for vegetable oils, and Polenske's process for detecting